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THE AMERICAN JOURNAL OF SOCIOLOGY

VOLUME III

MARCH, 1898

NUMBER 5

CHARACTER BUILDING AT ELMIRA.

MANUAL training, at the New York state reformatory, was introduced in the fall of 1895, to meet the needs of men especially defective among the general abnormal reformatory population.

The courts commit men under the indeterminate sentence system (although maximum sentence is fixed), leaving the period of "parole" commission to be determined by the board of managers. This board declares that to obtain a parole men shall have passed successive examinations in trade school and department of letters, and shall have a sustained perfect demeanor record for four months preceding their appearance before the parole board. When a man has fulfilled these conditions, he is considered fit to be temporarily and experimentally returned to society, and the permanence of his release the man alone decides.

Our crowded condition demanded additional reformative measures in order to increase parole release. For those whose long residence in our community brought their stay quite up to the maximum commitments the evident causes were failures in trades, department of letters, or demeanor markings.

It was early discovered that deep physical and moral causes were fundamental, and that the restoring means must operate directly upon the sensory organs, and that the man must be additionally influenced by developing activities.

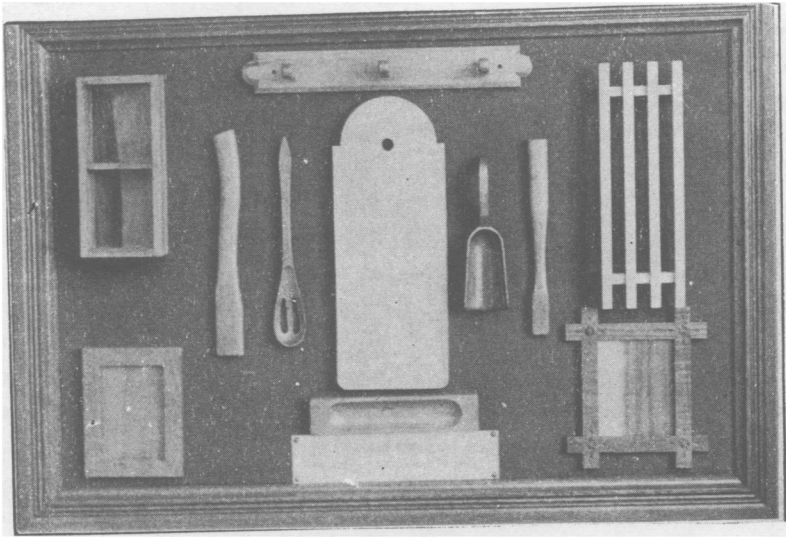
In order to appreciate this Herculean task, it must be realized that we have committed young men who are as weak morally, intellectually, and physically as years of evil association and its consequent disregard for law and established rights of others can make them. They are heirs of degeneracy of several generations, with a total abhorrence of honest labor. They have been sent to the reformatory as, legally, first offenders, but court records do not always tell the previous deeds. It is from this class that the larger part of the inmates come. Habits of dishonesty, slothfulness, and licentiousness, which are the distinguishing characteristics of most men committed, follow them for a long period. In selecting manual training as an agent to assist these defectives, the deciding principle was that habit produces character, and that moral action arises from the choice between right and wrong doing, whether this be in work upon a plastic material under control of form and accurate predetermined measurements, or in the complex organism of the ego, and its relation to society at large.

The new education is everywhere recognizing the importance of the education of the will, and of leading the will to express itself in outward habits and customs. This was the theory of Aristotle, Froebel, and Pestalozzi. "We acquire the virtues by doing the acts," and when virtuous habits are sequentially maintained, the will automatically directs in the paths of virtue.

Manual training, in its full development, stands for regularity of fixed purposes and orderly sequences. In this manual doing the doer has at his command the basis of true living, the full opportunity for observing cause and effect, and for regulating his habits of thought and expression from a knowledge of fixed principles. It has long been a known fact in educational circles that studious employment, under regulated methods, is the keynote to a liberal education. In fact, this is why for years professors have drilled on Greek and Latin verbs, and formulas in mathematics; but, while that served well, it is inadequate to a full and harmonious development.

The normal man requires intellectual, moral, religious, and

physical development, and under our present school and college systems this is sometimes secured, but the fact comes to us as forcibly that the abnormal man needs the same discipline even in greater degree. The duty for us lay in adapting it to meet the needs of the selected defectives.



MODELS FROM COURSES IN SLOYD WOOD WORK

And here it must be realized once for all that the essential difference between manual training in our public-school system and the reformatory system is, first, in the classes of society furnishing the subjects, and, second, the object desired.

In the public schools we have the plastic minds of eager, earnest youth, surrounded by desirable home influences, with the interest of the parent to aid the child to a full realization of the necessity for education. Added to that is the interest and natural curiosity of child life as it watches the development of form, symmetry, and use, from crude blocks of wood, clay, or compact mass of metals; each assuming new form and use as direct results of the cultivated mind and manual skill of the instructor.

This forms the actual incentive among children to pursue courses in manual training, but in the reformatory system the

first condition is lacking. Our pupils come from a stratum in society in which the directing, controlling force of the parent, with the desire for good, wholesome education, has never been asserted. The child surrounded by the virtues and vices of society has followed the paths of sin, and at the important formative period of life, when character, intelligence, and industry should have been cultivated, they were not. The child reaches the threshold of manhood without the acquisition of those forces which make a useful member of society, and so the power of the state isolates for treatment those whose training by parents has been neglected.

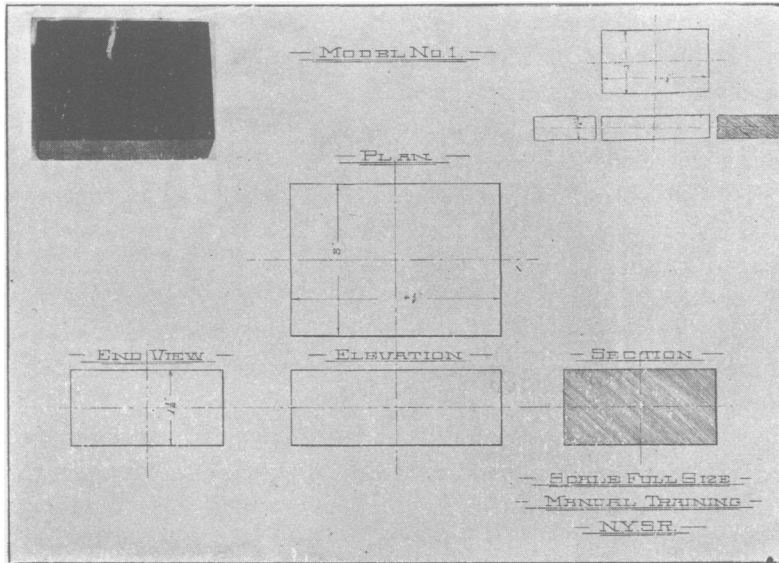
Our manual training system, then, is based upon a physiological fact, viz., that for every important part of the body, of those which are under control of the will, there is a region of the brain by which it is controlled, and these are what are known as "centers" in the brain. For instance, there is one part of the brain which controls the muscles of the right arm, and if that part be diseased, or be destroyed in any way, the power of using the arm is lost; so that, if a certain part of the brain is capable of controlling the motions and activities of a certain part of the body, it is possible by cultivating the actions of that part of the body to produce a better condition of affairs in the brain.

Having that fact and material which can be molded at will under guidance of the trained hand, we begin our work of reclamation among these pupils, irresponsive to the usual reformatory measures designed for their restoration to society.

We have as agents: 1) manual processes; 2) physical training; 3) military discipline.

Manual processes.—By this we mean the selection of special subjects which are calculated to meet and overcome the special defects in particular groups of men, using materials in paper, wood, metal, and clay, operated upon with tools. The development of tool skill is not the object. But by the use of material agents, from correct models or outlines made specially to illustrate a principle in mathematics or moral law, a force may be set in motion which shall act upon the mind, brain, and body

to produce healthy, beneficial thought and action. Keep up this training, with new interest and expectation on the part of the pupil, and habits of concentration, discrimination, and decision are formed which lead to increased mental and moral enlargement.



GROUP I.—MECHANICAL DRAWING FOR MATHEMATICAL DEFECTIVES

Manual processes, correctly taught, lead to tool skill, but if that be all, the object of its introduction into courses designed to meet particular defects of pupils segregated because of specific abnormalities is lost sight of, and the results are not what we start out to obtain. There must be a mental quickening, a moral expression, exhibited by clearer conception, and by well-regulated habits. By such results we test the efficiency of our work.

Physical training.—All pupils spend one and one-half hours each day in the gymnasium. The same basal group divisions are followed closely, and different forms of physical exercises, followed by baths, are prescribed to meet the particular group defect.

No form of athletics is tolerated which simply gives pleasurable sensations ; there must be a definite relationship between the gymnastic effort and the object desired in particular groups of pupils.

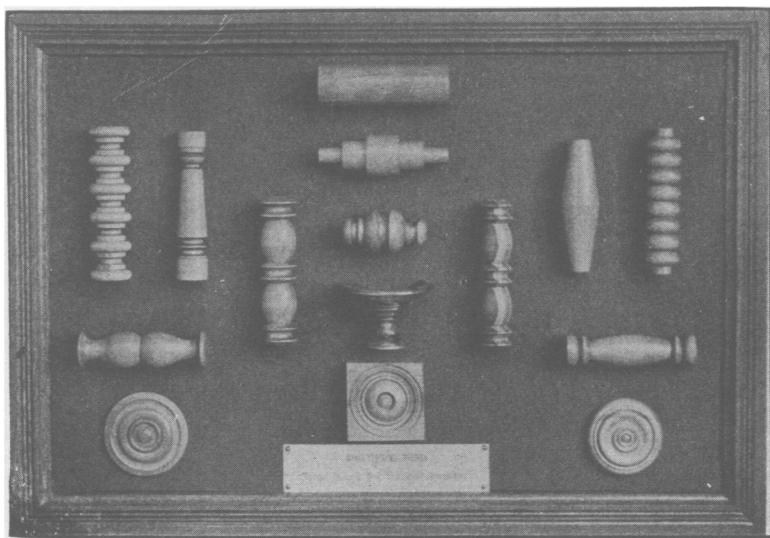
In Group I (mathematical defectives) the gymnastic action of swinging dumb-bells and clubs is not left to the individual, but is performed in regular time, guided by a particular note at intervals on the piano or at command, and thus alertness, quickened perception, and prompt execution are secured. In outdoor games each pupil is required to lay out to a standard size courts for hand- and football, tennis, etc., and measure the jumps with a small unit, say two feet. All such exercises tend to develop the mathematical faculty as well as to keep the body in healthy action.

In Group II (self-control defectives) the United States army and navy "setting up" exercises are used, in which regularity of movement and persistence in particular performances are the principles.

Group III (general mental quickening). Wherever there is regular muscular movement, there is increased activity within definite limits controlled by the brain. In weak-minded persons, or those of limited mental capacities, though normally sane, these physical harmonies are undeveloped, and so, instead of erect carriage, easy, graceful movement, we have the awkward, shambling, ungraceful form, operated by the undeveloped brain. Exercises for these include calisthenics, dumb-bell, long-pole and bar-bell, special apparatus known as "chest weights," marching to time, rope and pole climbing, and frequent baths. Physical growth has its reflex development in mental training. This is mental quickening, through physical performances.

Military discipline.—The entire prison population is enrolled in the military organization. The regular daily movement of squads for any purpose whatever is under the command of an officer who may rank from sergeant to major, each responsible to the colonel for the order, time, and presence of each man. One of these majors is detailed in charge of the discipline in the manual school, having as aids citizen captains and inmate lieu-

tenants, who are responsible to him during the school hours, and who act as monitors in regulating the groups. The classes change their places each ninety minutes, going from one part of the building to another, to meet the instructor in the subjects for that period. When a pupil desires some tool or material



GROUP II.—MODELS FROM COURSE IN WOOD TURNING FOR CONTROL DEFECTIVES

to pursue the outline under consideration, he must first get permission from the officer to move, or to call the instructor's attention to his wants. In this manner the entire disciplinary regulation becomes a potent force in controlling the irregular movements of the large number of selected defectives, whose movement individually or collectively must be under authority.

How pupils are selected.—As previously stated, the "parole" regulation requires: (a) knowledge of a trade sufficient to compete in outside life with the average mechanic and by competitive labor prove an ability to sustain one's self in communities; (b) ability to use the elements of mathematics taught in the classification of the pupil, which may be from "notation" through "percentage," and language so as to construct spoken

or written sentences ; (*c*) regulating one's habits so as to prove an ability to associate with others and enjoy liberties without endangering our social fabric. Those who fulfill these conditions are released ; those who do not must be more earnestly labored with.

The superintendent selects these irresponsible, disordered members of our reformatory society for specific treatment in the manual training department, making groupings as follows :

Group I (b), mathematical defectives (100 pupils), is composed of those who habitually fail in arithmetic. When these pupils are assigned, a division into sections of twenty-five men is made, upon the basis of "mathematical" deficiency, that is, those in correlated sets in department of letters. For these subjects are selected into which mathematical propositions especially enter, both in tool processes and mental training, and these are taught with the object of aiding these men to know the combinations and use of numbers.

The subjects are :

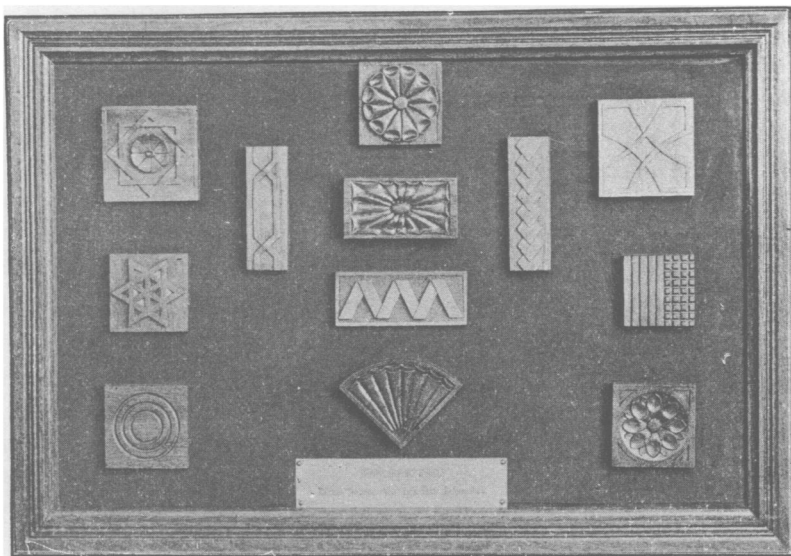
First term, 17 weeks, 35 hours per week : mechanical drawing, sloyd, athletics and calisthenics, clay modeling, and mental arithmetic. Second term, 17 weeks, 35 hours per week : mechanical drawing, sloyd, athletics and calisthenics, cardboard construction, and mental arithmetic. Third term, 17 weeks, 35 hours per week : mechanical drawing, sloyd, athletics, calisthenics, wood turning, and mental arithmetic.

Group II (200 pupils), assigned for development of self-control, is composed of those who for the most part are devoid of moral tone, those who fight, swear, assault officers, are licentious, and generally irresponsible to the usual reformatory measures selected for their reclamation. To this class belong some of the most intellectual in the reformatory, but this intellectuality, as a result of weak character, runs riot. They are like a steam engine with full steam on and no governing apparatus, with energy uncontrolled, a destructive force instead of constructive. These are divided into sections of twenty-five each, according to their mental capabilities, with subjects as follows :

First term, 17 weeks, 35 hours per week : athletics and calisthenics, geometric construction, involving intersections of solids, etc.; wood turning,

pattern making, mechanical drawing, and sloyd. Second term, 17 weeks, 35 hours per week : athletics and calisthenics, wood carving, clay modeling, sloyd, and mechanical drawing. Third term, 17 weeks, 35 hours per week : athletics and calisthenics, chipping and filing, molding, mechanical drawing, and sloyd.

One section of these "control" defectives is composed of pupils who are also defective in arithmetic, and these have additionally to the "control" subjects mental arithmetic for one and one-half hours per day.



GROUP III.—MODELS FROM COURSE IN WOOD CARVING FOR GENERAL MENTAL QUICKENING

Group III (150 pupils), object, general mental quickening, is composed of men who are among the lowest intellectual and physical order, men in whom hereditary influences for generations have left a legacy of diseased bodies and disordered brains. These fail especially in department of letters and trades ; are tractable enough, in most cases, to earn first-grade standing if demeanor alone determined the social standard, but the repeated failures to pass in letters and trades result in social depression, with tenure of commitment prolonged.

Subjects as follows :

First term, 17 weeks, 35 hours per week : athletics and calisthenics,

free-hand drawing, from solids and familiar objects; elementary sloyd, clay modeling, mental arithmetic, and sentence building. Second term, 17 weeks, 35 hours per week: sloyd, free-hand drawing, wood carving, mental arithmetic, and calisthenics. Third term, 17 weeks, 35 hours per week: sloyd, free-hand drawing, wood turning, athletics, and mental arithmetic.

In November, 1896, the maximum enrollment was 117 pupils in manual training, with 10 instructors. In October, 1897, our equipment was further increased to accommodate additionally 225 pupils, making the total capacity for manual training instruction 450, with 40 inmate instructors, graduates of the manual training school, and three citizen instructors. Classes not being held on Saturdays, that day of each week is employed in giving instruction to inmate instructors in the theory and practice of manual training and its applications to reformatory needs.

It may be interesting to state our facilities for instruction: 100 iron-frame drawing tables, with equipments; 100 cabinet sloyd benches, with equipments; 50 clay-modeling tables, with equipments; 25 tables for cardboard construction, with equipments; 25 carving benches, with equipments; 10 cabinet pattern-making benches, with equipments; 25 chipping and filing benches, with equipments; 25 molders' benches, with equipments; 25 iron-frame wood-turning lathes, with equipments; 1 15-horse-power electric motor.

We have active preparations under way for instructing fifty additional pupils, which will give permanent appliances for a total enrollment of 500 pupils, or, roughly speaking, one-third of our reformatory population.

SPECIMEN RECORD OF PUPILS GRADUATED.

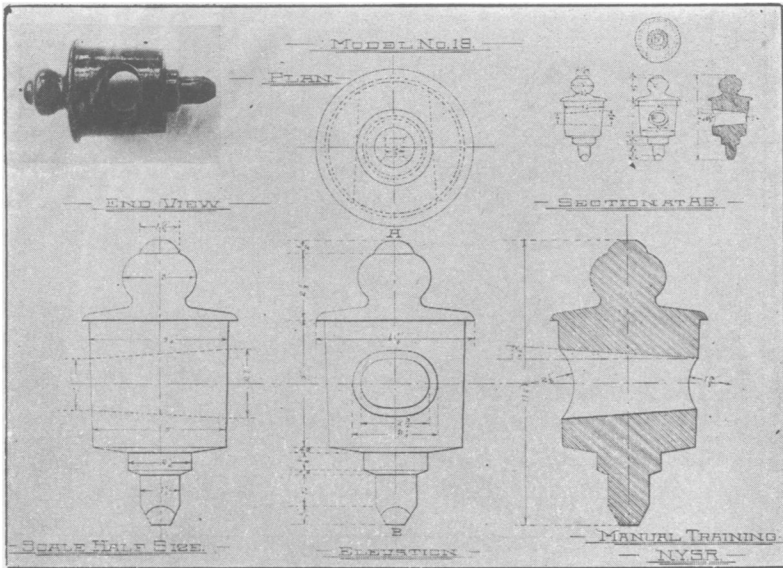
GROUP I.

Conv. 6197.—Received October 26, 1893; height, 5 ft. 7½ in.; age, 17 years; weight, 126 lbs.; maximum, 20 years; crime, robbery, first degree; proposed trade, tinsmith.

This pupil's record shows four successive failures in arithmetic previous to his assignment to the manual training, which began with subjects as follows: Mechanical drawing, clay modeling, athletics, sloyd, mental arithmetic; each subject one and one-half hours per day, five days per week. He failed the first month after manual training assignment. He was becoming familiar

with his environment. In the second month the result of manual processes, in which observation and discrimination must decide the truth or error of his own work by comparison with standard predetermined results, was showing.

This awakening was so noticeable that he was advanced. The three months following he passed 90 per cent., 90 per cent., and 80 per cent., at which time, May 5, 1897, he graduated from manual training and returned as



GROUP I.—MECHANICAL DRAWING FOR MATHEMATICAL DEFECTIVES

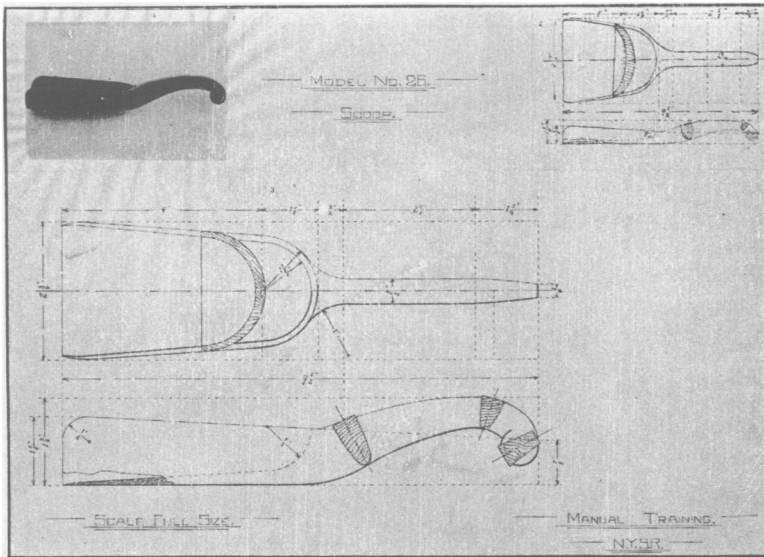
susceptible to the usual reformatory treatment. In the same month the school director advanced him to difficult multiplication and division and miscellaneous problems, in which he is passed regularly, making in the September examination 100 per cent. His actual assignment to manual training was four months and seven days, and he acquired in that time the use of numbers from notation to miscellaneous tables and their application:

GROUP II.

Conv. 6163.—Received January 30, 1894; height, 5 ft. 2¼ in.; age, 21 years; weight, 124 lbs.; maximum, 5 years; crime, burglary, third degree; proposed trade, blacksmith.

This pupil, previous to his assignment to the manual training, had earned for himself the sobriquet of "dangerous man" among the officers and inmates. His offenses have been mostly threatening language, lying, contraband articles, talking, fooling, assaulting officer, and institutional crimes of that nature.

We begin his record in September, 1895, when he was reduced to the second grade for "fighting." October and November he lost three marks each for lying and threatening language, which with the influence of September markings caused his reduction to the third grade of incorrigibles, the closely confined group. He was in the third grade two months and three days when he was placed in the foundry, where, amidst blinding smoke, stifling air, and



GROUP II.—OUTLINE IN SLOYD WOOD WORK FOR CONTROL DEFECTIVES

the "task" system, it was thought he would tone down, upon the theory that the muscular demands of such a place on a 124-pound body would weaken the will and curb the disposition to riotous acts. From January 15 to February 15 he was on modified treatment. On February 18 he was unconditionally restored to the second grade. February and March he did fairly well, losing one mark each month; but in April his period of passably well doing was checked by his committing an assault, along with assumption of authority, and on the 27th of February he was returned to the third grade for the second time, remaining in the same two months and three days, when he was again placed on "modified" treatment and did well for three months, when he slumped again, this time for fighting, losing six marks in October. In November he braced up and made a perfect month, securing promotion to the second grade.

On December 15 he was assigned to the manual training, Group II; object, development of self-control, with subjects as follows: athletics, drawing, sloyd, wood work, chipping and filing, molding—each subject one and

one-half hours per day, five days per week. The influence of the new environment sustained the effort made in November to improve, and, by securing a perfect month in December, all his past was blotted out and he was restored to the lower first grade through "amnesty" on December 25, 1896.

Conv. 6361 on December 25, 1896, is where he was institutionally classed at the time of his admittance two years and three months ago, viz., lower first grade, from which all who are committed begin the reformatory course of treatment. In January, 1897, he lost two marks as a result of school failures. In February he secured a perfect demeanor record. In March he lost two marks. April and May were perfect months in all respects, and he was graduated from the manual training department in May, returned to institutional life, and assigned to the exercise squad in the morning and stonemasonry in the afternoon. Later his daily assignment was changed, placing him in the molding class of the technological department to complete trade. From this he was returned to the manual training as assistant instructor in the molding class, and is doing well in all departments, having been promoted to the upper first grade in August, and ranking as sergeant in "I" Company.

GROUP III. — DATA.

Conv. 6577.—Received June 30, 1894; height, 5 ft. $\frac{1}{4}$ in.; age, 17 years; weight, 112 lbs.; maximum, 5 years; crime, grand larceny, second degree; proposed trade, printing.

On March 17, 1896, his daily assignment was changed from the manufacture of umbrellas to the manual training department as a pupil in Group III. The records show repeated failures in arithmetic. He had been in the reformatory nine months previous to manual training assignment and showed no signs of susceptibility to the usual treatment, being at this time in the second grade with failures as noted. Immediately following the assignment to the manual training he was reduced two sets in arithmetic and advanced one class in language.

Successive failures in arithmetic and trade school, with irregular passing in language for eight months, led to reduction to a lower set in arithmetic. Observe that with these failures in subjects above noted is the corresponding increased loss of marks: May 31 he lost five marks; June 30 he lost fifteen marks; July 21, lost twenty-one marks, and in August four marks, showing that the undeveloped mind leads its physical and recognizable self to violate established laws. Observe next that, while no progress is shown in language or arithmetic during the eight months between March and November, there is a marked depreciation of demeanor markings, and in November a perfect month is made, resulting from passing in language, arithmetic, trade school, and demeanor. This "toning down," this enlargement of perception and regulated expression, is the result of manual training. December shows another perfect month, with markings as follows: language,

100 per cent.; arithmetic, 90 per cent., and nature studies, 88 per cent.; trade school, 76 per cent., and a promotion through "amnesty" to the lower first grade. In January he was advanced in arithmetic and to "B" class in language. He passed with good percentages, viz., 95 per cent., 80 per cent., and 79 per cent. This now becomes a sustained record, and in May he was graduated.

Manual training for this pupil shows its effectiveness, first, through regulation of the physical forces in his nature; second, through tool processes in which varied accurate movements are required which produced a mental awakening and appreciable ability to perform the arithmetic of his "set" classification; third, the capability after graduation of sustained susceptibility to the usual reformatory influences to effect his release.

FINAL SUMMARY OF MANUAL TRAINING RESULTS.

GROUPS I, II, AND III.

A.

	Number.		Per cent.
Total number of pupils enrolled.....	485		
<i>a</i> Those withdrawn within three months for cause....	31	or	6.39
<i>b</i> Those too recently assigned for record.....	238	or	49.07
Those showing slight improvement.....	28	or	5.77
Those showing steady improvement, but not sufficient to graduate.....	19	or	3.92
Those showing no improvement and term of assignment from three to twenty-two months.....	95	or	19.59
Those graduated.....	74	or	15.26
	<hr/> 485	or	<hr/> 100.

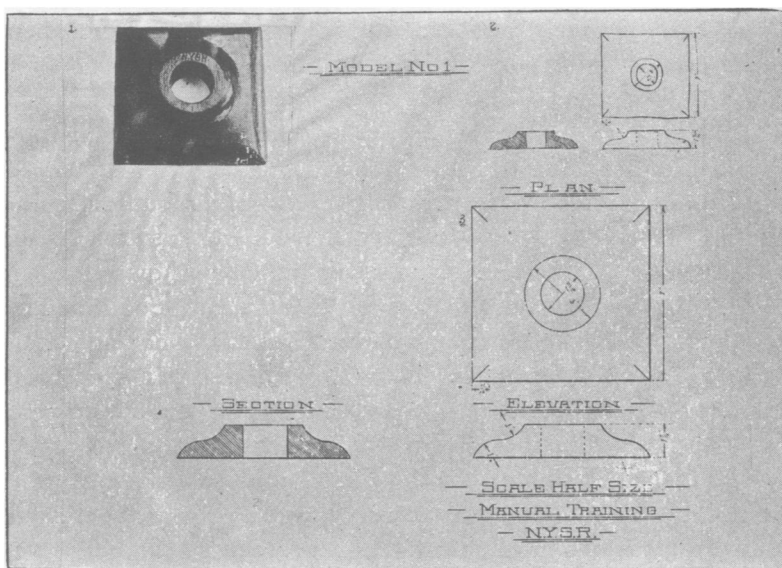
B.

	Number.		Per cent.
Total number of actual pupils in attendance one year....	216		
Those showing slight improvement.....	28	or	12.96
Those showing steady improvement, but not sufficient to graduate.....	19	or	8.80
Those showing no improvement and term of assignment from three to twenty-two months.....	95	or	43.98
Those graduated.....	74	or	34.26
	<hr/> 216	or	<hr/> 100.

METHODS OF INSTRUCTION.

In the following pages on "Methods of Instruction" I have selected two subjects from those for each group, namely, drawing and sloyd wood work, from which to illustrate the tool operations and their relations to mental and moral development of the selected defectives. For Group II, I have illustrated wood turning and its special application for these control defectives.

In Group I, Section 1, Division A, mathematical defectives, the subjects are for the first term of seventeen weeks: 7:20 to 8:50 A. M., sloyd; 8:55 to 10:25 A. M., mechanical drawing; 10:30 to 12, athletics; 1:10 to 2:45 P. M., clay modeling; 2:50 to 4 P. M., mental arithmetic.



GROUP II.—MECHANICAL DRAWING FOR CONTROL DEFECTIVES

In Group II, control defectives, first term, Section 1, Division A, the subjects are: 7:20 to 8:50, athletics; 8:55 to 10:25, cardboard (development of surfaces, intersection of solids, etc.; these are drawn, then folded to represent the solid form); 10:30 to 12, sloyd; 1:10 to 2:45 P. M., wood turning; 2:50 to 4, mechanical drawing.

In Group III, general mental quickening group, first term, Section 1, Division A, the subjects are: 7:20 to 8:50, free-hand drawing; 8:55 to 10:25, elementary sloyd; 10:30 to 12, elementary wood carving; 1:10 to 2:45, athletics; 2:50 to 4, mental arithmetic and language.

Mechanical drawing.—The first lessons are in elementary geometric constructions, such as bisecting lines, erecting per-

pendiculars and constructing triangles, finding the radius of a circle from an arc, etc. When these sheets have been completed, a wide departure is made from the usual method in mechanical drawing-class instruction. We do not spend time in finding the projections of a point or a line in the many planes in which they may be projected; that would be next to impossible among the pupils forming our classes; certainly we could not get them interested and hold their attention for one and one-half hours at a time day after day. Instead, we design models in which the principles of projection are shown, beginning with elementary forms and proceeding to the complex.

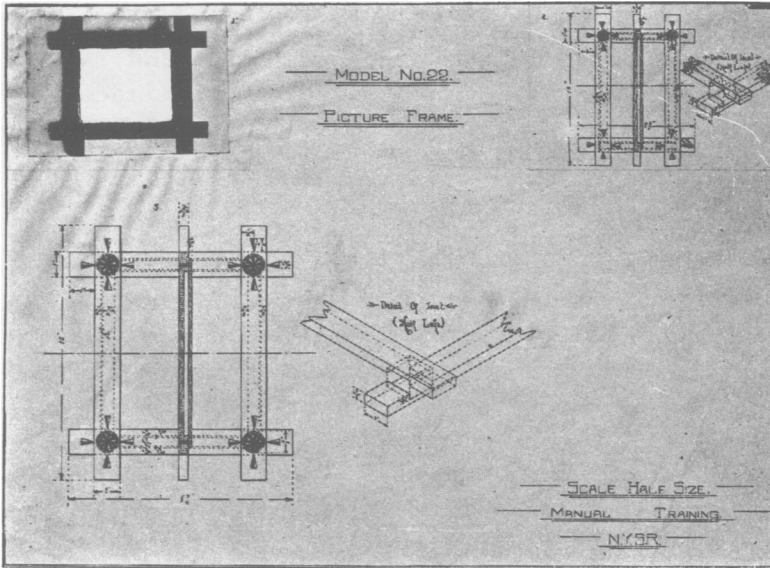
In some models the scale is full size, in others half size, and in others twice full size. It may at once be discerned from inspection of the successive views of models shown that the course is comprehensive and difficult; also, that good drawings are made, for the sheets from which these half-tones and etchings were made are from pupils in the classes. In the model listed as No. 1, Group II (p. 591), we have shown it photographed, and at the top right it is shown as a free-hand sketch.

The first operation of the pupil is to draw in plan, elevation, and section the model under consideration, putting thereon all needed dimensions mechanically to represent the model in the several planes of projection. When this is done and accepted, a new paper is given, the model taken away, and from the sketch is made the mechanical drawing.

Free-hand drawing. Group III, general mental quickening.—In this class we begin with a series of short vertical lines, spaced as near equally apart as the pupil can guide with the eye. The instructor makes the first one, setting the distance for the second; then the pupil begins to make the other five; then the same method is used to produce five horizontal lines spaced alike and of equal length. Next, the lines are crossed at regular intervals, forming little squares. Then longer verticals are drawn, these to be connected by short horizontals spaced as near equally apart as the eye can regulate. Next, larger squares are formed, then heavy shade or double lines are made. Now the foregoing principles and lines are crossed to produce suggestive forms. The

object on this sheet is to have the pupil appreciate the value of verticals and horizontal lines, lines of unequal length; also, to teach comparison of length and spacing.

In sheet No. 2 we begin with left oblique lines of equal strength and length, these to be connected at the bottom with



GROUP I.—OUTLINES IN SLOYD WOOD WORK FOR MATHEMATICAL DEFECTIVES

right oblique lines of the same spacing and length as the left oblique lines. Next, a dotted vertical line is dropped to pass through the intersection of the extreme right of the left and right obliques; then, with equal space from this vertical is drawn a light right oblique, the same to the bottom by a left oblique line; then paralleled thereto is drawn the same number of right and left oblique lines in pairs, alternating with one of light and heavy strength.

From these suggestive oblique forms are made, next, a square formed by dotted lines, and this space filled with right and left oblique lines to form little squares. Next, right and left oblique lines are drawn to form squares joining one another on their diagonals, forming suggestive border decorations.

From this sheet we pass to solid forms drawn singly and *ensemble*, followed by shading. Later, vase forms and floral sketches, fruits, vegetables, and combinations of these.

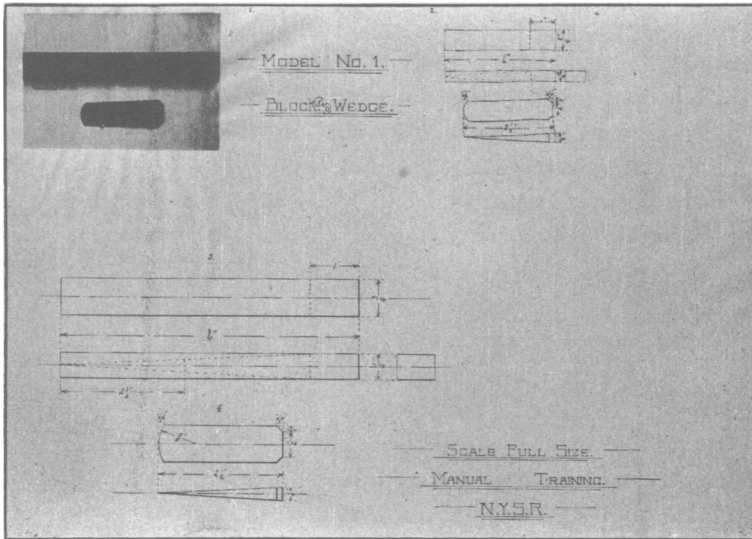
I consider free-hand drawing for members of this group one of our best subjects, as it awakens interest in form, symmetry, and suggestive decorations; and, further, it appeals to the imagination, which finds expression through free-hand sketching. We do not employ rules or mechanical guides of any kind; the object is to train the eye to discriminate between the disordered lines and the orderly; to regulate the hand movements by depending upon mind impressions as transmitted through the optic nerve to the brain. Thus we have mental quickening through free-hand drawing.

Sloyd class.—We show in No. 22 (p. 593) a model used in Group I, mathematical defectives. At the top left corner is a photograph showing the completed frame. At the top right is the free-hand drawing made from looking at a frame already constructed. In the lower view is the mechanical drawing representing the orthographic projections of elevation and section, also an isometric view of one of the corners showing the method of lapping the joint. The pupil, having made the free-hand sketch and a mechanical drawing, is supplied with stock in the rough, larger in size than the finished pieces as assembled. The pieces and joints are formed with jack-plane, square, gauge, buck-saw, and block-plane.

Here is introduced division of fractions, to find the half of three-eighths of an inch, and have the ends project one inch in both directions over the place of union. A process in addition, then subtraction, must be performed, since, if it projects 1 inch on each end and it is 2 inches on both, then 2 inches from 10 inches leave 8 inches, which is the distance from outside to outside of the shorter pieces. If these operations have been well performed, the two pieces match evenly in direction of their thickness and fit the size of the frame.

Next is the operation of putting in a back to the frame. This must be planed to the thickness of $\frac{1}{8}$ of an inch, secured by screws equally spaced in two beveled strips, which bevel

must be $\frac{1}{8}$ of an inch from the vertical. The width of these strips added to the length of the back makes a total of $7\frac{1}{2}$ inches; each strip is $\frac{1}{2}$ inch wide; then the two make 1 inch; then $7\frac{1}{2}$ inches, the combined length of sliding back and guides, from 8 inches in width between outside and outside of



GROUP III.—OUTLINE IN SLOYD WOOD WORK FOR GENERAL MENTAL QUICKENING GROUP

short pieces, leave $\frac{1}{2}$ inch; then, if there is a difference of $\frac{1}{2}$ inch between actual width of back and outside of frame, to make the back have equal distances on each end from outside of a frame; then we must divide $\frac{1}{2}$ of an inch into two parts, which is $\frac{1}{4}$ of an inch; then the two half-inch strips are to be screwed on to the frame $\frac{1}{4}$ of an inch from the outside edge.

Tool performances aid and enforce recognition and appreciation of the mathematical. When we have repeated these operations through a series of models designed to meet the special mathematical defect, then we obtain mathematical quickening through tool performances.

In the upper left-hand corner is shown model No. 26 (p. 588), a scoop, as photographed, representing the actual model from

which the pupil draws a free-hand sketch shown in the upper right-hand corner. Upon this sketch are placed the dimensions indicating the several values which are necessary mathematically to represent the orthographic projections drawn mechanically; these are shown in the two views at bottom of the sheet.

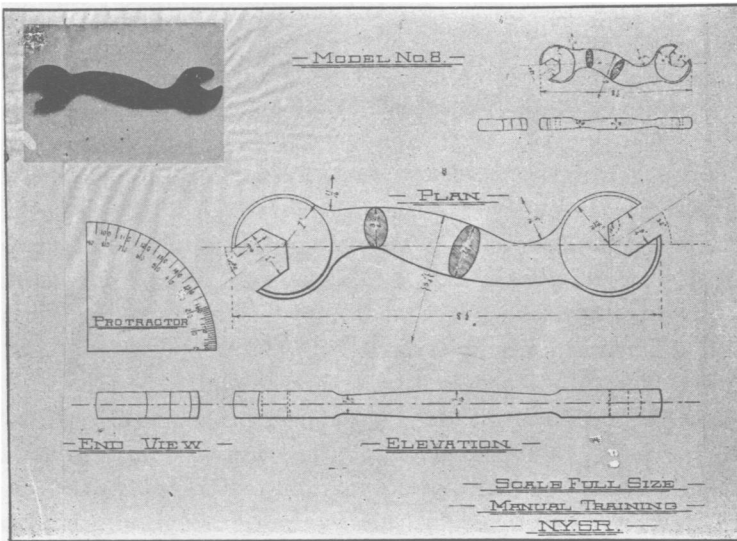
The instructor supplies each pupil with the model and drawing paper; the free-hand sketch is made and submitted. If it shows the necessary projections and dimensions, then a large sheet of paper, drawing board, triangles, "T" square, and dividers are given. The pupil must now draw, mechanically, the views representing No. 26, as per sketch, not having the model. When this is accepted, stock and tools are supplied, and the actual operation of making a scoop begins. The stock must first be planed to a rectangular block, the size of which will incorporate the irregular form of the model.

Next, the lines representing the plan are cut on the curves with a thin, narrow saw; then the surface indicated by the long top slant line is cut off, followed by the top curve of the handle. We now have our first signs of a scoop. The tools used up to now are plane, square, rule, and saw; these are tools which test length, angularity, and smoothness of surface.

The next operation is to remove the mass of stock following the inside curve lines, thus forming the "bowl" of the scoop. Two new tools are introduced here: the gouge and scraper; these and two additional tools, the wood file and sandpaper, are used to give the complete form and symmetry, as found in the finished model.

This is an excellent model for developing "self-control." There is concentration of mind in following the progressive stages of its development; muscular activity is employed, where energy is applied in one case liberally, removing large quantities of material and employing the larger muscles, and immediately following is a cautious, measured operation, employing delicate muscles in severalty and unison, producing accurate form and dimensions which must be tested by the eye, and judged by the pupil's concept of pleasing form and harmonious line combinations.

Wood-turning class.—In this class we have first a primary tool called a gouge. In the preceding tools the stock to be operated upon is held in a vise, which secures it against any movement ; here the wood is secured to the spindle of the head



GROUP I.—MECHANICAL DRAWING FOR MATHEMATICAL DEFECTIVES

stock of the lathes and follows its path of rapid motion, making in some cases 1200 revolutions per minute.

The attention given to this rapid and dangerous machine, when the pupil has been instructed in cause and effect, is a "control developing" agent in regulating the impetuous movements of a pupil disposed to hurry, not for the sake of increasing output, but from an inherent and ever manifest disposition to do the things hurriedly and in a slighting manner.

In producing the correct surfaces, the operation is one in detail rather than mass ; this requires more concentration than before, and a new idea of combination enters. These forms must be similar in curves and measurement, to form the pleasing elegant designs as shown.

Sloyd class. Group III, general mental quickening group.—Among pupils of this group the muscular movements are slug-

gish; the motor nerves send sensations to the brain, but these are not received as definite lasting impressions, so we must be particular in class instruction to give but a single impression at a time, introducing tools which call for a free muscular movement, employing the mass movement before going to the combinations. Work is upon a project which involves few tools and a single impression, so that the mental concept can assimilate the desired truth, use it, tabulate it, and file it for future use.

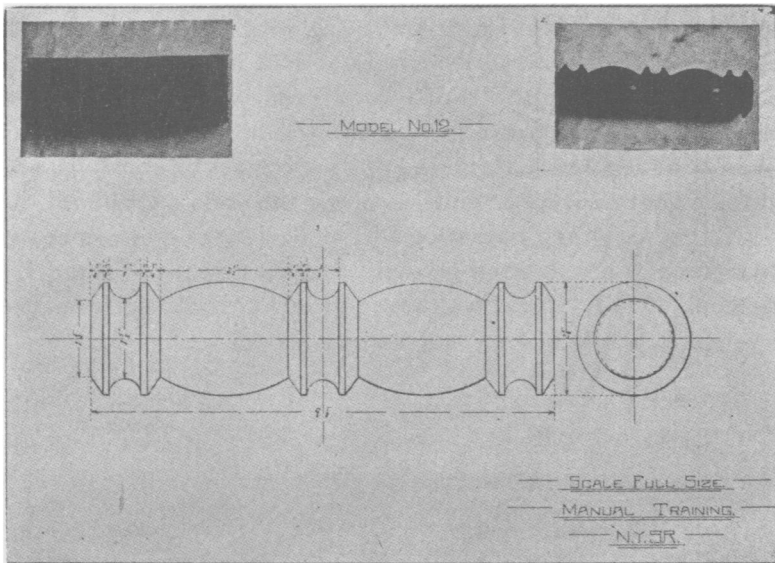
In model No. 1 (p. 595) is shown at top left a block of wood, also a finished piece called a wedge. At the top right is the free-hand sketch, in the lower view is the mechanical drawing. The pupil makes the free-hand drawing from a perfect model, then with paper, rule, pencil, and "T" square draws the mechanical representation. A thorough drill is made upon the twelve lines which indicate the size and form of the model; then a block is supplied from which the tool performances begin. This tool is the knife. In operation the pupil stands firmly, with one foot a little in advance of the other, the left elbow lightly touching the side; the left hand holding the block securely, the right hand holding the knife, and a swinging motion beginning from the elbow joint, a cut on the block is made; this is a contracted movement of the lower biceps muscles of the right arm.

These muscular expressions have habituated the motor nerves to send definite messages; the brain has received them. Simple arithmetic has been employed and something produced. The result of these actions is mental quickening through tool performances.

In the preceding models before No. 8 (p. 597) we have, with two exceptions, used the single impression idea, with such change in models as would employ different muscles and motor nerves. Model No. 8 is one of the three in the course wherein special combinations of muscular activities are employed, and motor nerves are employed in sending to the brain ideas in rapid succession.

The operations are as follows: First, the free-hand sketch from an accurate model, then the mechanical drawing; this accepted, the tool performances begin. The finished project is composed of six pieces; stock for these is supplied in rough.

Slats must be cut with the rip-saw larger than finished dimensions; this introduces discrimination and decision in allowing the additional dimensions for finish size. The muscles employed in ripping these strips are the muscles of the shoulder, alternately contracting and expanding, causing the entire arm to



GROUP II. OUTLINE IN WOOD TURNING FOR CONTROL DEFECTIVES

swing through a vertical plane horizontally. The motor nerves strike upon the part of the brain which regulates concentration of purpose, with the result that the tool actuated by these forces produces strips to be later planed to five-eighths of an inch wide and five-sixteenths of an inch thick, cut off, and ends planed to fifteen inches. Having produced four such strips, the two end pieces are made, and upon these are secured the strips. These employ the saw, plane, rule, gauge, and knife. The muscles used are the full arm swing for planing and sawing, and for cutting out the pieces between the legs; the muscles of the wrist conjointly with those of the fingers are used. This space is to be five-sixteenths of an inch deep. Here comes the mental operation of locating five-sixteenths of an inch on a rule, trans-

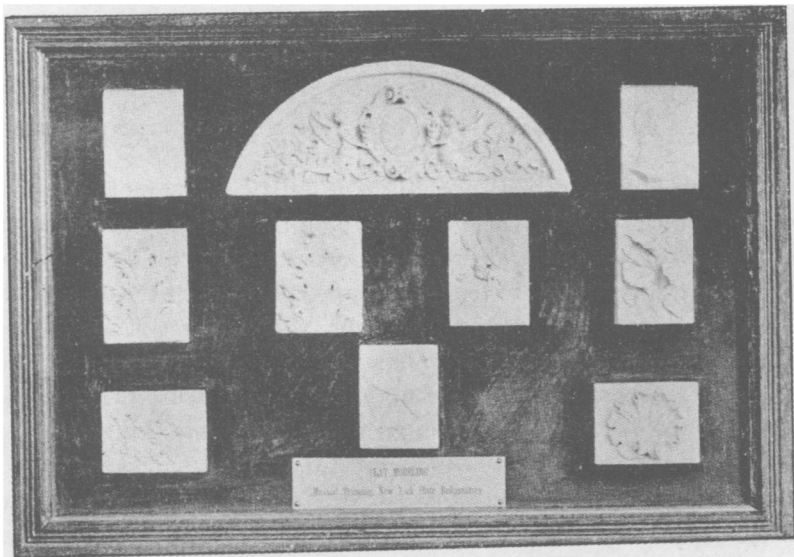
ferring it to the stock, and proving the accuracy of the operation by measuring with the rule.

After making these pieces to the respective dimensions comes the operation of combining these to agree with the drawing; here is an appeal to the constructive or order element in the brain, and to the finer muscular combinations. The tool processes are first to secure with brads one of the long slats to the leg piece at a distance of one and one-half inches from the end, having the end of the short piece even with the edge of the slat. This operation is repeated until each end of the two outside slats is secured. Next, the inner two must be equally spaced between the two outside slats, keeping the ends on a line.

If the foregoing operations have been well performed, we have a neatly constructed model called a "flower-pot stand," in the making of which we have through tool performances developed mental and muscular quickening.

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GROUP II.—MODELS FROM COURSE IN CLAY MODELING FOR CONTROL DEFECTIVES